Nutrition in Encapsulating Peritoneal Sclerosis (EPS)

Rosalind Campbell - Renal Dietitian
Manchester Royal Infirmary, UK
Email: rosalind.campbell@cmft.nhs.uk
Tel: 0161 2764478
EPS at Manchester Royal Infirmary

• Manchester Royal Infirmary (MRI) is one of two National specialist centres for Encapsulating Peritoneal Sclerosis (EPS) surgery in the UK. The second is Addenbrook’s in Cambridge.

• MRI has built up a vast and varied experience in EPS patients, particularly with a surgical focus. It has a well-functioning MDT who work together to optimise patient care.

• The EPS team at MRI believe in sharing our experience and raising awareness of EPS among renal disciplines, in the hope that this will lead to earlier identification and intervention to improve patient outcomes in this potentially devastating disease.
Macroscopic appearance of EPS

- Peritoneum becomes thickened & sclerotic
- Adheres to gut, impairing its motility & function
- Mesentery, stomach, liver, spleen, gall bladder, pelvic organs & abdominal wall may be involved
- Adhesions tether bowel to abdo wall
- Fibrin cocoon/encapsulation of small intestine & sacs of ascites causing obstruction
### TABLE 3
Proposed Staging of Encapsulating Peritoneal Sclerosis

<table>
<thead>
<tr>
<th>Stage</th>
<th>Clinical findings</th>
<th>Therapeutic approach</th>
</tr>
</thead>
</table>
| Stage 1 (pre-EPS period) | Loss of ultrafiltration capacity  
Development of a high transport state  
Hypoproteinemia  
Bloody dialysate, ascites  
Calcification of peritoneum | Peritoneal rest  
Peritoneal lavage  
Glucocorticoids |
| Stage 2 (inflammation period) | Increase in C-reactive protein  
Increase in white blood cells  
Fever  
Bloody dialysate  
Ascites  
Weight loss  
Appetite loss  
Diarrhea | Glucocorticoids |
| Stage 3 (encapsulating or progressive period) | Disappearance of the signs of inflammation  
Appearance of symptoms/signs of ileus (nausea, vomiting, abdominal pain, constipation, abdominal mass, ascites) | Glucocorticoids  
Total parenteral nutrition |
| Stage 4 (ileus or complete period) | Anorexia  
Complete ileus  
Abdominal mass | Surgical intervention |

Nakamoto. PDI 2005; 25 (Suppl 4):S30-S38
Consequences of EPS

- Membrane failure
- Abdominal pain & distension - ascites / collections
- Poor appetite / fullness
- Impaired gut function - reduced peristalsis & absorptive capacity
- Nausea & vomiting - Immunosuppression caused GI disturbances can mask EPS
- Constipation / diarrhoea
- Weight loss - can be masked by oedema / ascites
- Low albumin / raised CRP
- Malnutrition
- Mortality can be high [1-3]
- Intra-abdominal sepsis / bleed
- Gut ischaemia / necrosis
- Bowel fragility / perforation
Patient monitoring for EPS

**Patient on PD for ≥ 5 yrs**

- **Investigations:**
  - PET with 3.86% UF profile
  - CRP / albumin
  - Regular dietetic review
  - Observe peritoneum if having surgery
  - CT abdomen if having GI symptoms

- **Peritoneal thickening** with or without UF failure - consider transfer to HD

**Patient on HD / Tx with hx PD**

- **GI symptoms monitor:**
  - Indigestion / reflux
  - Nausea / vomiting
  - Abdominal bloating, bowel changes, ascites
  - Low albumin / high CRP
  - Weight loss
  - Regular dietetic r/v & regular TW r/v if ascites & weight loss present

- **Alarm signs / obstructive symptoms** - refer to surgeon
Surgery for EPS

- Surgical opinion should be sought early after diagnosis
- Only way to potentially ‘cure’ EPS
- Conservative treatment does not remove the cocoon or prevent further development of the condition
- Surgery should be timed so that it is considered after an adequate trial of medical therapy and before the patient is too nutritionally and metabolically decompensated
- Risks vs. benefits of surgery discussed
- Complications - intra-abdominal sepsis, bleeding, bowel perforation, fistula, stoma
- Mortality - semi-elective, emergency
- Re-occurrence
Malnutrition and surgery

- Prevalence and clinical importance of malnutrition in renal patients well-documented [4-5]

- Known relationship between nutritional status and outcome in renal disease [6-7]

- Reduced nutritional intake, GI / obstructive symptoms, dysmotility / reduced absorptive capacity and the inflammatory state of EPS can lead to development of severe malnutrition [8]

- This is likely to be a crucial factor in the morbidity and mortality associated with EPS [9]

- Surgical stress alters metabolism and induces catabolism [10-11]
Literature review of nutrition in EPS

Summers et al, Single-centre experience of encapsulating peritoneal sclerosis in patients on peritoneal dialysis for end-stage renal failure, KI, 68:2381-2388


Review of EPS patients over 5 years at Manchester Royal Infirmary

- EPS caused weight loss with malnutrition
- The Japanese experience advocated the encapsulating stage is managed with parenteral nutrition (PN) and if ileus symptoms remain, treated with surgery
- Surgical EPS patients benefit from several weeks of nasogastric aspiration, intravenous feeding and daily haemodialysis
- PN needs to be used in combination with surgery, usually prior to it
- In cases of EPS with obstruction, aggressive nutritional support must be given

Retrospective EPS research project at Manchester Royal Infirmary

- During12 months pre-diagnosis, 8 patients (35%) lost >10% of body weight, BUT weight can be unreliable due to ascites and oedema
- 74% patients experienced significant albumin decrease, BUT albumin levels may also reflect infection or the inflammatory nature of EPS
- It is a limitation of this study that other nutritional markers were not recorded
- Future studies should prospectively measure markers, e.g. upper-arm anthropometry and handgrip strength
- Aggressive nutritional support is essential pre and post-operatively
UK Encapsulating Peritoneal Sclerosis Clinical Practice Guidelines July 2009, produced by the UK EPS Clinical Guidelines Group, download from Renal Association website: www.edren.org

- Gastrointestinal symptoms, with reduced nutritional intake, and the inflammatory catabolic state in EPS can lead to the development of severe malnutrition [8]
- Malnutrition a crucial factor in the morbidity and mortality associated with EPS
- Patients should be referred to a specialist Renal Dietitian early / on diagnosis
- Careful and regular monitoring of nutritional status is essential
- Due to the presence of abnormal fluid balance and ascites, weight alone is an insufficient marker of nutritional status
- Handgrip strength, mid arm circumference (MAC), mid arm muscle circumference (MAMC) and subjective global assessment (SGA) are all suitable alternatives
• Early nutrition intervention and supplementation if required
• Significant risk of refeeding syndrome must be recognised [8] and NICE guidelines [12] adhered to
• Milder cases, energy dense diet +/- oral nutritional supplements and anti-emetics
• If unable to tolerate sufficient oral intake, nasogastric or nasojejunal feeding may be indicated
• Severe cases / degrees of bowel obstruction, usually PN alone or with adjunctive therapy
• Mortality rates in patients on PN alone considered
• If bowel function does not recover with time, home PN may be required
• Conservative management of bowel obstruction may require drainage via nasogastric tube for symptomatic control, and intravenous fluid replacement
Parenteral nutrition (PN) risks.

- Catheter related complications
  - Line sepsis
  - Thrombosis, embolism
  - Heart/lung puncture
- Metabolic complications
  - Respiratory compromise
  - Liver impairment
  - Glucose / lipid metabolism
  - Raised urea levels
- GI complications
  - Brush border atrophy
  - Overgrowth / translocation
  - Cholestasis [13]

However..

- Many concerns associated with PN from the literature are due to giving PN to well-nourished patients or overfeeding, which increases complications, particularly sepsis
- Translocation of gut bacteria may be due to intestinal obstruction rather than PN
- Appropriate PN is beneficial and does not increase sepsis in malnourished patients
- PN undertaken by experienced teams does not cause more complications than enteral nutrition [14]
Feeding benefits

- Known relationship between pre-operative nutritional status and surgical outcome [11, 15-17]
- Weight loss of >10% associated with poor outcome [17]
- Benefits of refeeding malnourished patients for one week were observed on a cellular level, before changes in nutritional indexes [18]
- Cellular activity involved in metabolism of feeding is normalised after one month of nutritional supplementation [19]
- Muscle contraction, fatigue, and performance can be reversed by nutritional support before any changes in body composition are detected [20]
- PN given to malnourished patients in adequate amounts for ≥7-15 days pre-operatively is likely to give significant improvements in both nutritional status and post-operative clinical outcome [21]
- Pre-operative enteral nutrition (EN) is as effective as parenteral nutrition (PN) in improving post-operative clinical outcome [21]
- Candidates for surgery for whom prompt initiation of preoperative PN or EN may reduce postoperative morbidity and mortality, irrespective of nutritional status can be identified pre-operatively [21]
MRI EPS surgery transfer form

Central Manchester University Hospitals

Details required before patient transfer to MRI for EPS surgery
To be completed by Consultant or Registrar of referring hospital

Referer Details
Refering Consultant: .................................. Email: ..................................
Hospital name: .................................. Ward/unit: ..................................
Hospital address: .................................. Fax: .................................
Ward/unit telephone no: ..................................

Patient Details
Full name: .................................. Gender: M / F
DoB: .................................. NHS no: ..................................
Patient address: ..................................

Medical Details
Outpatient / inpatient, date of admission: ..................................
Underlying renal disease: .................................. Diabetes: Y / N
Cardiac hx: IH/angina □ AF □ hx CCTV □ PVD □ other: ..................................
Respiratory hx: COPD □ other: ..................................
Tx hx: Y / N, dates: .................................. Immunosuppression drug levels: ..................................
Dialysis: HD □ fistula / graft / line □ No. hrs / sessions / wk: ..................................
PD hx: dates: .................................. Recent peritonitis dates Y / N, PD catheter in situ Y / N
Previous surgery: ..................................
Existing wound: Y / N, Pressure sores / ulcers: Y / N
Urine output: .................. ml / h, EPS diagnosis: date: ...........
Echo: Y / N, CPEX test: Y / N, Myocard: Y / N
Metal implants / pacemakers / neural stimulators: ..................................
Line(s) in situ: .................................. Date(s) placed: ..................

Functional Details
Exercise tolerance on flat: .................. m, No. of flights stairs able to climb: 0 □ 1 □ 2 □

Nutritional Details (raise with your diet)
Weight: .................. kg, Dialysis target weight: .................. kg, Height: .................. m
Oedema: Y / N, Ascites: Y / N
Weight hx: .................................. Change in past 6 months: .................. kg, %
Oral fluid intake: .................. ml / d, Diet intake: ..................................

Dietetic input (raise with your diet)
Nutrition: PN / PPN / NG / NJ, Feeding line / tube type: .......................... Date placed: .............
EN (if appropriate): name: .................. volume: .................. ml, time: .................. hrs
PN: volume: .................. ml, g N: .................. g fat: .................. g glucose: ..................
Vitamins & trace elements: ..................................
Insulin regimen (if appropriate): ..................................

Medications
..........................
..........................
..........................
..........................

Allergies:
..........................
..........................
..........................
..........................

Biochemistry & Haematology (most recent results)
Na  K  C.Ca  Mg  PO4  eGFR  Alb  CRP  ALT  ALP  Bil  TG  WCC  Hb  Platelet
..........................
..........................
..........................
..........................

Details of Person Completing Form
Name: .................................. Position: .................................. Date: .............

Please fax to: Mr Augustine on 0161 276 8020
MRI EPS surgical patient journey

- EPS diagnosed by GI symptoms & CT or laparotomy
- Patients admitted prior to EPS surgery for pre-operative evaluation and nutritional support
- Multi-parameter dietetic assessment
- Pre-operative nutritional support commenced in nutritionally deficient patients – usually Hickman line for 7-10 days pre-operative parenteral nutrition (PN)
- Surgery
- Critical care
- PN continued into post-operative period
- Continuous post-operative assessment, review & adaptation of nutritional management
Dietetic complexity of EPS surgery

- Renal patient (HD)
- Complex nutritional support / PN management
- Critical care
- Co-morbidities (DM)
- Surgery
- Gastro-EPS/stoma
• Patient demographics: gender, DoB, ethnicity, modality
• Basic anthropometry: wt, est. dry wt, ht, BMI
• Weight history: % weight loss in previous 6-months
• Upper arm anthropometry: MAC, TSF, MAMC, handgrip
• Bloods: alb, CRP, K, PO4, Mg, CCa, Zn, LFTs, GGT, lipids, blood sugars
• Fluid balance: in/out, BP, physical appearance
• Current symptoms:
  – upper GI: nausea, vomiting, indigestion/wind, early satiety, poor appetite
  – lower GI: abdo pain, bloating, diarrhoea, constipation
• Oral intake:% of kcals & protein requirements met
• Need for pre-operative PN assessed
• Refeeding risk assessed & vitamins px as indicated [22]
• Pre and post-operative nutritional support provided
• Monitoring: biochemical, anthropometric, symptomatic, dietary
Malnutrition factors

- BMI <20kg/m² [12]
- MAC, TSF, MAMC <5th percentile [22-23]
- Handgrip strength <85% normal [24]
- Wt loss ≥10% [25]
- Albumin <30mmols/l [26-27]
- Inflammation (HD/MIA syndrome)
- Metabolic factors (infection, dialysis)
- Diet intake <80% requirements [28]
- Presence of GI symptoms / impaired gut function [12]
- Presence of oedema / ascites [13]
- Low micronutrient levels (insufficient intake, GI/dialysis losses) [12]
- Low serum electrolytes (re-feeding, renal, dialysis) [12]
- Mood, motivation, depression
## Haemodialysis patient
- Low volume, electrolyte-free bag (1.4 kcal/ml)
- 1.5L, 12.9g nitrogen, 2160kcals, 100g fat, 250g glucose,
- Calculate proportion of bag required
- 7.5mmols PO4 plus added electrolytes as required
- Water-soluble vitamins daily
- Fat-soluble vitamins 2 x wk
- Additional micronutrients if necessary (Zn, Se, Fe, Cu, Mn)
- Glutamine (if on ICU/HDU >7days)
- 24hr feeding (cyclic if indicated)
- Adapt composition as required

## Transplant patient
- Normal volume, electrolyte-containing bag (1.0 kcal/ml)
- 2.0L, 11.5g nitrogen, 2000kcals, 80g fat, 250g glucose,
- Calculate proportion of bag required
- Added electrolytes as required
- Water-soluble vitamins daily
- Fat-soluble vitamins daily
- Additional micronutrients if necessary (Zn, Se, Fe, Cu, Mn)
- Glutamine (if on ICU/HDU >7days)
- 24hr feeding (cyclic if indicated)
- Adapt composition as required
Pre-operative nutrition status

- BMI may still be normal
- Percentage weight loss average 15%
- Handgrip strength and anthropometry low
- Poor appetite in <50% patients
- GI symptoms vary and are not always present
- Most common symptoms - vomiting, nausea, abdo pain, bloating
- Albumin is low and CRP raised in the majority of cases
- Most EPS patients are zinc deficient
- SGA classes >90% of EPS patients as malnourished

Findings from 3 years EPS surgical patient data, Campbell R & Summers A 2011 unpublished
<table>
<thead>
<tr>
<th>Symptom</th>
<th>Date</th>
<th>Date</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Poor Appetite</strong> - yes / no</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Nausea</strong> - severity (0-10) no nausea- worst nausea ever</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>frequency (times/d)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>pattern (e.g. smell food)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Vomiting</strong> - volume (mls/vomit)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>frequency (times/d)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>description (e.g. undigested)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>pattern (e.g. after food)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>on liquids / solids</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Indigestion</strong> - state, e.g. wind, heartburn, reflux</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Abdo pain</strong> - severity (0-10, no pain- worst pain ever)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>description (e.g. sharp / dull)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>frequency (times/d)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>pattern (e.g. after big meal)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Bloating</strong> - severity (0-10, no bloating - worst bloating ever)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>frequency (times/d)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>pattern (e.g. when BNO)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Bowels</strong> - Bristol Score (1-7)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>volume (mls)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>frequency (times/d)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>colour (e.g. pale, dark)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Passing flatus</strong> - yes / no</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Post-operative complications impact on post-operative nutritional status:

- Infections / sepsis - increase requirements, prevent anabolism
- Intra-abdominal collections - reduce appetite, fullness feeling
- Respiratory failure - require critical care
- Diarrhoea - reduce enteral absorption
- Pressure ulcer / open wound - increase requirements, protein losses
- Bowel resection / stoma - reduce gut length / absorptive capacity
- Bowel fistula / perforation - limits enteral capacity
Post-operative feeding

• Parenteral nutrition (PN) continues post-operatively until their gut is able to sustain requirements through oral and/or EN

• This can be several weeks post-operation, or if surgery is complicated by stoma formation, enterotomy or open wounds, then PN may need to continue longer-term

• Surgeon or surgical Specialist Registrar assesses when your gut is ready to be used for feeding and whether to commence via oral or enteral nutrition (EN)

• Artificial nutrition support is continued until you are able to sustain your nutritional requirements through oral intake alone

• Duel PN/EN routes often used

• Normal renal diet- no clear benefit from low residue diet
References


2. Rigby RJ and Hawley CM. Sclerosing Peritonitis: the experience in Australia. NDT 1998; 13:154-159


References

23. Gray GE and Gray LK. Validity of anthropometric norms used in the assessment of hospitalised patients. JPEN 1979; 366-368
26. ASPEN Board of Directors. Guidelines for the use of parenteral and enteral nutrition in adults and paediatric patients. Parenteral and Enteral Nutrition 1993; 17(4) Suppl